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National Exposure Information System (NEXIS)

Team
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Project Summary
In August 2002 the Council of Australian Governments (COAG) published a review of natural disaster relief and mitigation arrangements in Australia (COAG, 2002). One of the recommendations from this review included a commitment by COAG to "develop and implement a five-year national program of systematic and rigorous disaster risk assessments". In response to this commitment, Geoscience Australia (GA) has undertaken a series of national risk assessments for a range of natural hazards.

A detailed risk assessment requires an understanding of the number and type of buildings, people, infrastructure, structure value and contents of the building exposed to the hazard. The NEXIS project has been created to achieve this and develop a nationally consistent buildings exposure database.

Several assumptions and approximations were made in creating the database. The Geocoded National Address File (G-NAF), produced by the Public Sector Mapping Agency (PSMA), was fundamental in determining the spatial location of buildings. Mesh blocks, produced by Australian Bureau of Statistics (ABS), were used to derive the usage of buildings. Other spatial data used to collate relevant information for the buildings database include:

- Streetpro (from MapInfo);
- Cadastre (from PSMA);
- Census data (from the ABS);
- Australian Housing Survey (from the ABS); and
- Hazards U.S. (HAZUS) classification system.

The most important component of the database is the estimation of the value for each structure and its contents. These values were estimated using the cost models derived as part of the earthquake risk assessment conducted for GA's multi-hazard risk assessment of Perth. The cost model estimates the structure value, which is based on the floor area, and the age of the building. The contents value is derived using floor area and the household income.

Image left: *Example of the National Building Exposure Database (NEXIS) for Townsville (image Geoscience Australia). Click to enlarge.*

Currently, a nationally consistent buildings database for residential exposure is being developed. The commercial buildings database is in its design phase.

The database will support multi-hazard national risk assessment projects. It will enable the risk research group to estimate risk more accurately for the tsunami warning system and the critical infrastructure project. The Australian Emergency Management Committee (AEMC) and state and territory emergency services will be able to use the database to manage risks to communities more efficiently and effectively. In addition, this database will help improve fundamental national datasets such as the ABS Meshblocks and GNAF by identifying and reporting errors.

Information contributing to NEXIS includes:
- Building name
- Longitude and latitude
- Address
- Usage
- Number of residences
- Residence type (such as separate house, semi-detached, apartment)
- Area
- Type of roof and walls
- Structural value
- Contents value
- Number of people per residence

More building and socio-economic information will be incorporated as new datasets or sources of information become available.
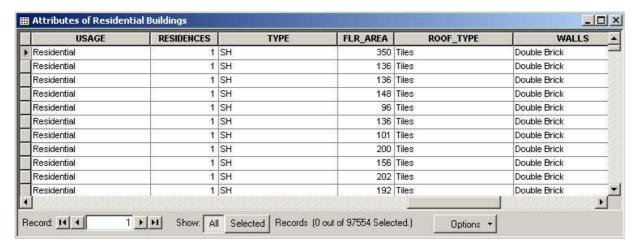

Image above: Example of the National Building Exposure Database (NEXIS) attribute table (image Geoscience Australia).

This database project will become a part of the National Risk Exposure Information System. The proposed exposure information system will consist of fundamental datasets (ABS Census, ABS Meshblocks, ABS Housing Survey, G-NAF, StreetPro and Cadastre) and incorporate international models such as HAZUS. The fundamental datasets are to be stored in a relational database (a geodatabase will be used for spatial data and Oracle for non-spatial data). This will be aligned with GEMD-IM strategies and will incorporate building attribute data created or collected by the risk research group.

References
Council of Australian Governments (2002), *Natural Disasters in Australia: Reforming mitigation, relief and recovery arrangement*, Australian Government, Canberra.

Project links
Australian Bureau of Statistics (ABS)
Council of Australian Governments (COAG)
MapInfo
Public Sector Mapping Agency (PSMA)